

**TABLE 1**  
*Assessment and Candidate Measurement Endpoints, Risk Questions, Candidate Focal Species/Feeding Guilds, and Analysis Approach Proposed for the Problem Formulation Expansion of the UCR BERA Work Plan*

Assessment Endpoint	Risk Questions	Candidate Measurement Endpoints Needed for BERA	Candidate Focal Species/Feeding Guilds	Analysis Approach
Aquatic Plants				
1a. Survival and-Growth of Aquatic Plants	Are the levels of COPCs in surface water, porewater, or sediments from the UCR Site greater than benchmarks for the survival or growth of aquatic plants?	COPC concentrations in surface water, porewater, sediment, and associated physical/chemical measurements	Rooted and non-rooted submergent and emergent macrophytes and algae	• COPC concentrations in surface water, porewater, and sediments vs. benchmarks / literature-based toxicity thresholds
Terrestrial Plants				
1b. Survival and-Growth of Terrestrial Plants	Are the levels of COPCs in soils from the UCR Site greater than benchmarks for the survival or growth of terrestrial plants?	COPC concentrations in soils and associated physical/chemical measurements	Grasses, forbes, woody shrubs, and trees	• COPC concentrations in soils vs. benchmarks/ literature-based toxicity thresholds
Aquatic Invertebrates				
2a. Survival, Growth, and Reproduction of Aquatic Invertebrates	Are the levels of COPCs in surface water, sediments, or porewater from the UCR greater than benchmarks for the survival, growth, or reproduction of aquatic invertebrates?	COPC concentrations in surface water, pore water, sediments, and invertebrate tissues, and associated physical/chemical measurements		• COPC concentrations in surface water, sediment, near-bottom water and pore-water vs. benchmarks/ literature-based toxicity thresholds
	Is the survival, growth, or reproduction of aquatic invertebrates exposed to sediments from the UCR Site unacceptably lower than in reference sediments?	Survival, growth, reproduction, and tissue concentrations of aquatic invertebrates in laboratory toxicity tests	Benthic invertebrate communities(e.g., <i>Hyaella azteca</i> and <i>Chironomus dilutus</i> )	• COPC concentrations in sediment vs. toxicity thresholds developed from site-specific concentration-response curves • Matching chemistry data to support interpretation of toxicity test data from Site and reference samples. • TIEs may be used to identify the cause of toxicity
	If required, then as determined by EPA, are the levels of COPCs in invertebrate tissues greater than effect levels for the survival, growth, or reproduction of aquatic invertebrates?	Field collected and/or archived (note: EPA would strike "archived") laboratory invertebrate tissues and associated physical/chemical measurements		• COPC concentrations in tissues vs. literature-based toxicity thresholds
	Terrestrial Invertebrates			

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2b. Survival, Growth, and Reproduction of Terrestrial Invertebrates	Are the levels of COPCs in soil from the UCR Site greater than benchmarks for the survival, growth, or reproduction of terrestrial invertebrates?	COPC concentrations in soil and associated physical/chemical measurements	Soft-bodied animals (e.g., <i>Eisinia foetida</i> ; earthworms)	• COPC concentrations in soil vs. benchmarks/ literature-based toxicity thresholds
	If required, then as determined by EPA, is the survival, growth or reproduction of terrestrial invertebrates exposed to soils from the UCR Site significantly lower than that in reference soils?	Survival, growth, and/or reproduction of terrestrial invertebrates in laboratory toxicity tests	Hard-bodied animals (e.g., <i>Folsomia candida</i> ; springtails)	Matching chemistry data to support interpretation of toxicity test data from Site and reference samples
Fish				
3. Survival, Growth and Reproduction of Fish	Are the levels of COPCs in surface water, porewater or sediments from the UCR Site greater than benchmarks for the survival, growth, or reproduction of fish?	COPC concentrations in surface water, porewater and sediments, and associated physical/chemical measurements	Omnivores (yellow perch, bluegill, redbside shiner, crappie, pumpkinseed, and smallmouth bass, rainbow trout), insectivores (rainbow trout, whitefish, pikeminnow, kokanee, lake whitefish, mountain whitefish), benthivores/detritivores (largescale sucker, longnose or bridgelp sucker, sculpin) piscivores (walleye, smallmouth bass, pikeminnow, burbot).	• COPCs in surface water, porewater, and sediment vs. Sediment Quality Criteria/ benchmarks/ literature-based toxicity thresholds.
	Are the levels of COPCs in fish tissues from the UCR Site greater than critical tissue values for the survival, growth, or reproduction of fish?	COPC concentrations in the tissues (whole body) of fish from the UCR and reference areas, and associated variables (e.g., percent lipids, fish species, fish length, weight, age)		• COPCs in whole fish vs. literature-based tissue residue toxicity thresholds
	Are the levels of COPCs in the diets of fish utilizing habitats at the UCR Site greater than toxicity thresholds for the survival, growth, or reproduction of fish?	COPC concentrations in dietary items of-fish and associated physical/chemical measurements		• Compare modeled dietary uptake concentrations with literature-based fish diet benchmarks/ literature-based toxicity thresholds
	Is the survival or growth of fish exposed to surface water, porewater, or sediments-from the UCR Site significantly lower than that for reference media?	Survival and/or growth of fish in laboratory toxicity tests		• Use matching chemistry data to support interpretation of sturgeon toxicity data from Site and reference areas
Amphibians and Reptiles				

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4a. Survival, Growth, and Reproduction of Amphibians	Are the levels of COPCs in surface water, porewater, sediment, or soil from the UCR Site greater than benchmarks for the survival, growth, or reproduction of amphibians?	COPC concentrations in water, porewater, sediment, soil, and associated physical/chemical measurements	Salamander species (e.g., tiger salamander, <i>Ambystoma tigrinum</i> )	• COPC concentrations in surface water, porewater, sediment and soil vs. benchmarks/ available literature-based toxicity thresholds
	If required, then as determined by EPA, is the survival, growth or reproduction of amphibians exposed to surface water, porewater, whole-sediments or soils from the UCR Site significantly lower than that for reference media?	Survival, growth, or reproduction of amphibians in laboratory toxicity tests. Fetal and embryonic toxicity in amphibians (African clawed toad) as measured using standard laboratory toxicity testing (e.g., FETAX)	Toad species (see Appendix B of BERA Work Plan) Frog species (see Appendix B of BERA Work Plan)	• Use matching chemistry data to support interpretation of amphibian toxicity data from Site and reference areas
	Are the levels of COPCs in surface water, porewater, sediment, or soil from the UCR Site greater than benchmarks for the survival, growth, or reproduction of reptiles?	COPC concentrations in water, sediments, pore water, and soil, and associated physical/chemical measurements	For example: Painted turtle ( <i>Chrysemys picta</i> ), Lizard species, Western skink ( <i>Eumeces skiltonianus</i> ), snake species (see Appendix B of BERA Work Plan)	• COPC concentrations in surface water, porewater, sediment and soil vs. benchmarks/ available literature-based toxicity thresholds
<b>Birds</b>				
5. Survival, Growth and Reproduction of Birds	Do the daily doses of COPCs received by birds from consumption of the tissues of prey species and other media at the UCR Site exceed TRVs for survival, growth, or reproduction of birds?	Concentrations of COPCs in surface water, sediment, soil, and the modeled and/or measured tissues of prey species (i.e., whole-body tissue residues) and associated measurements (e.g., prey size)	Herbivorous birds Omnivorous birds Aerial Feeding Insectivorous birds	• Modeled dietary uptake concentrations for birds vs. literature-based toxicity thresholds
	Are the concentrations of COPCs in sediments or soils from the UCR Site greater than benchmarks for the survival, growth, or reproduction of birds?	COPC concentrations in soil, sediment and associated physical/chemical measurements	Sediment- and soil-probing birds Piscivorous birds Carnivorous birds	• COPCs in soil and sediments vs. benchmarks /literature-based toxicity thresholds for birds
<b>Mammals</b>				

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6. Survival, Growth and Reproduction of Mammals	Do the daily doses of COPCs received by mammals from consumption of the tissues of prey species and from other media at the UCR Site exceed the TRVs for survival, growth or reproduction of mammals?	Concentrations of COPCs in surface water, sediment, soil, modeled and/or measured tissues of prey species (i.e., whole-body tissue residues), and associated measurements (e.g., prey size)	Herbivorous mammals Omnivorous mammals Invertivorous mammals Piscivorous mammals Carnivorous mammals	<ul style="list-style-type: none"> <li>Modeled dietary uptake concentrations for mammals vs. literature-based toxicity thresholds</li> </ul>
	Are the concentrations of COPCs in sediments or soils from the UCR Site greater than benchmarks for the survival, growth, or reproduction of mammals?	COPC concentrations in soil, sediment and associated physical/chemical measurements		<ul style="list-style-type: none"> <li>COPCs in soil and sediment vs. benchmarks /literature-based toxicity thresholds for mammals</li> </ul>